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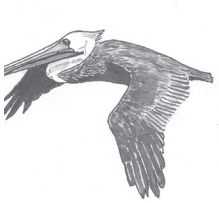
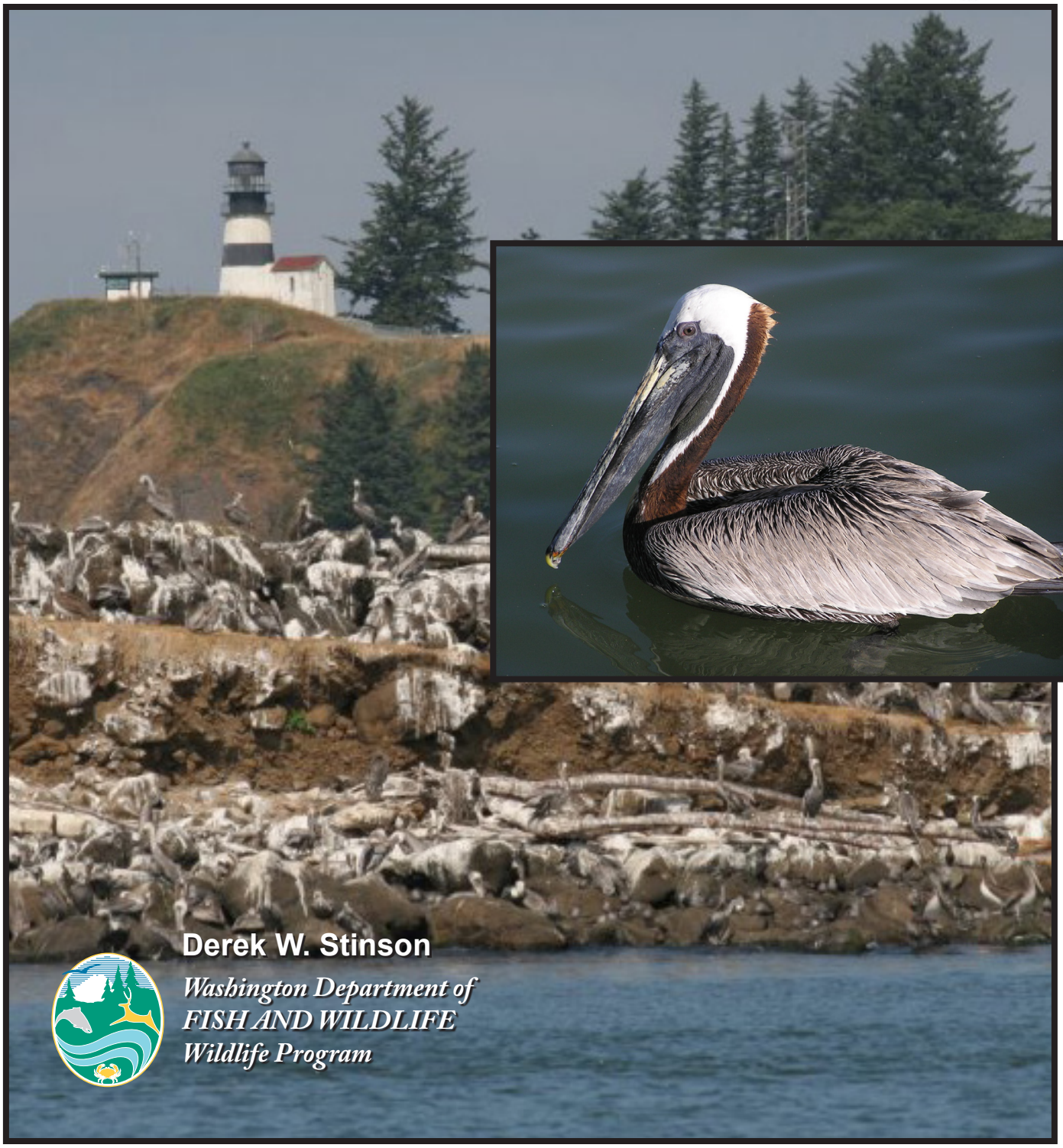
STATE OF WASHINGTON February 2015

Periodic Status Review for the Brown Pelican





Derek W. Stinson

Washington Department of
FISH AND WILDLIFE
Wildlife Program

The Washington Department of Fish and Wildlife maintains a list of endangered, threatened, and sensitive species (Washington Administrative Codes 232-12-014 and 232-12-011, Appendix A). In 1990, the Washington Wildlife Commission adopted listing procedures developed by a group of citizens, interest groups, and state and federal agencies (Washington Administrative Code 232-12-297, Appendix A). The procedures include how species listings will be initiated, criteria for listing and delisting, a requirement for public review, the development of recovery or management plans, and the periodic review of listed species.

The Washington Department of Fish and Wildlife is directed to conduct reviews of each endangered, threatened, or sensitive wildlife species at least every five years after the date of its listing. The reviews are designed to include an update of the species status report to determine whether the status of the species warrants its current listing status or deserves reclassification. The agency notifies the general public and specific parties who have expressed their interest to the Department of the periodic status review at least one year prior to the five-year period so that they may submit new scientific data to be included in the review. The agency notifies the public of its recommendation at least 30 days prior to presenting the findings to the Fish and Wildlife Commission. In addition, if the agency determines that new information suggests that the classification of a species should be changed from its present state, the agency prepares documents to determine the environmental consequences of adopting the recommendations pursuant to requirements of the State Environmental Policy Act.

This is the Draft Periodic Status Review for the Brown Pelican. It contains a review of information pertaining to the status of the Brown Pelican in Washington. The Department intends to present the results of this status review to the Fish and Wildlife Commission for action at an upcoming meeting. **Submit written comments by e-mail on this report by 15 May 2015 to:** T&Epubliccom@dfw.wa.gov

Or by mail to:

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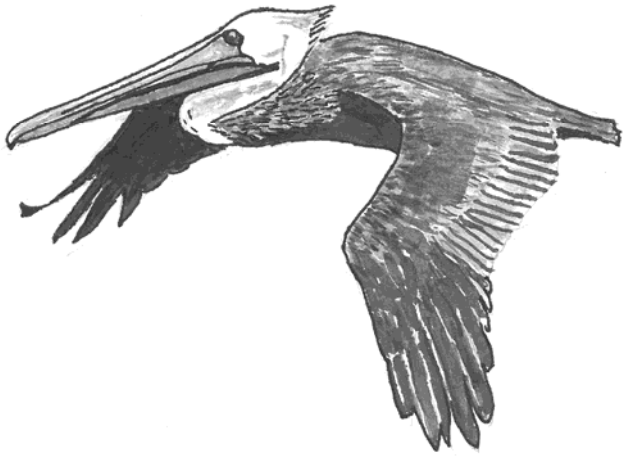

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February 2015

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ACKNOWLEDGEMENTS

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EXECUTIVE SUMMARY

The Brown Pelican (*Pelecanus occidentalis*) is currently listed as Endangered by the state of Washington. The Pacific coast and Gulf of Mexico populations were delisted by the U. S. Fish and Wildlife Service under the Endangered Species Act in 2009. These populations were listed as federally Endangered in 1970 in response to widespread pollutant-related reproductive failures and the population declines that directly resulted.

The Brown Pelicans present seasonally in Washington belong to the California subspecies (*P. o. californicus*). They nest on islands in the Gulf of California and along the coast of Baja California in Mexico north to Channel Islands National Park in southern California. California Brown Pelicans disperse north seasonally along the Pacific coast from nesting areas in search of food, with small numbers dispersing as far as southern British Columbia. Birds occur in Washington's coastal waters, mainly from April through November with a peak in late July to early September; their numbers decline in October and November with the onset of stormy weather. The total metapopulation of California Brown Pelicans has been estimated at 70,000 breeding pairs.

Roosting and loafing sites are important for Brown Pelicans, because their feathers can become water-logged; after feeding, they roost out of the water while they dry and preen their plumage. In Washington, Brown Pelicans gather in communal roosts on sandy islands, exposed shoals, and a few artificial structures in the Columbia River, Grays Harbor, and Willapa Bay estuaries, and rocky islands off the coast of the Olympic Peninsula. East Sand Island, Oregon, in the Columbia River estuary is currently the largest night roost for Brown Pelicans in the region, where their annual peak numbers have increased markedly from <100 during 1979-1986 to a high of >16,000 in 2009. Since that time, numbers have been declining, possibly in response to declining sardine abundance, itself a response to cyclic ocean conditions; the September aerial survey by the U.S. Fish and Wildlife Service counted 7, 018 in 2013, the lowest such count since 2001.

California Brown Pelicans feed primarily on small schooling fishes, including Northern Anchovies, Pacific Sardines, and Pacific Mackerel. The steady increase in Brown Pelican numbers in Washington from 1987-2011, was likely due to cyclic changes in ocean conditions that affect forage fish abundance, and also, perhaps the recovery of nesting colonies in the Southern California Bight. Although fluctuations in ocean conditions and forage fish abundance may cause periodic declines in pelican numbers in Washington, they are natural and are not a threat that can be mediated or eliminated through management.

We recommend that the Brown Pelican be removed from Washington's list of endangered species. Because Brown Pelicans concentrate at roosts, particularly at night, they should remain as a Priority Species due to these vulnerable aggregations. Brown Pelicans are still protected from 'take' by federal law under the Migratory Bird Treaty Act, and would remain a 'protected wildlife' species by state law if they are delisted.

INTRODUCTION

Brown Pelicans (*Pelecanus occidentalis*) are a largely marine species known for their plunge dives to capture fish, and the habit of roosting to dry their feathers. Nonbreeders are seen in substantial numbers in Washington's coastal waters. Brown Pelicans that occur in Washington waters are part of a population that was removed from the federal Endangered Species List in 2009 (USFWS 2009). The species was federally listed as Endangered in 1970 after dramatic declines caused by contamination by organochlorine pesticides, particularly dichlorodiphenyltrichloroethane (DDT). Brown Pelican populations recovered after the banning of most uses of DDT. Brown Pelicans usually feed on small schooling fishes, such as Northern Anchovies (*Engraulis mordax*), Pacific Sardines (*Sardinops sagax*), and Pacific Mackerel (*Scomber japonicus*) (USFWS 2009). In recent years, large numbers of Brown Pelicans (up to 16,000) have roosted on an island in the Columbia River estuary, and significant numbers have roosted at sites in Willapa Bay or Grays Harbor, and on rocky islands and beaches north to Neah Bay. The increase in pelican numbers from 1985-2011 was likely related to changing ocean conditions and the abundance of forage fish. The recovery of the population in the Southern California Bight may have contributed to this increase. Brown Pelicans are protected from 'take' by federal (Migratory Bird Treaty Act) and state laws (WAC 232-12-11).

DISTRIBUTION

Brown Pelicans are found along marine coasts of the eastern Pacific Ocean from southern British Columbia, south to Chile and the Galapagos; and on the Atlantic, Caribbean, and Gulf coasts from Maryland to Venezuela (AOU 1998; Figure 1). Within this range, the California Brown Pelican (*P. o. californicus*) nests on islands in four distinct geographic areas: (1) the Southern California Bight (SCB), which includes southern California and northern Baja California, Mexico; (2) southwest Baja California; (3) the Gulf of California, which includes coastlines of both Baja California and Sonora, Mexico; and (4) mainland Mexico further south along the Pacific coastline (Figure 2; USFWS 2007). Approximately 17% of the population nests in the SCB (Anderson et al. 2013). California Brown Pelicans seasonally migrate north along the Pacific coast from nesting areas in search of food, with small numbers migrating as far as the southern coast of British Columbia (Shields 2002). Nesting colonies in southern California are the closest to Washington, but there is a large post-breeding migration out of the Gulf of California, so the exact origins of birds that occur in Washington are uncertain. Birds return to the south by December (Briggs et al. 1983, Wahl 2005).

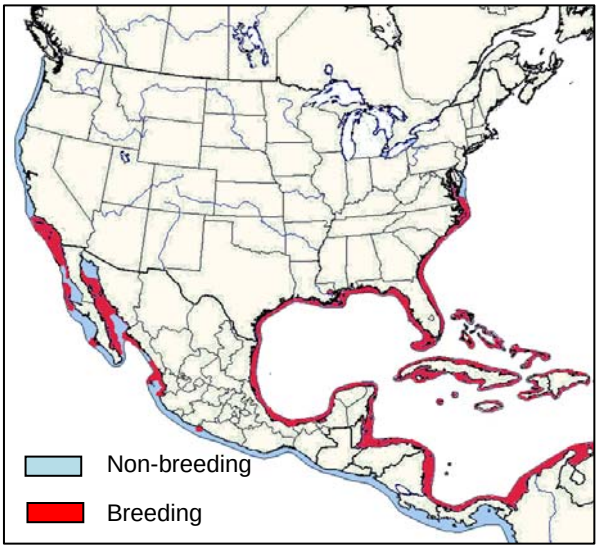

Figure 1. Breeding and non-breeding ranges of the Brown Pelican in North America.

Washington. Brown Pelicans occur primarily on shores and waters of Washington's outer coast from the Columbia River, north to Cape Flattery, mainly from late April through November with a peak in abundance from late July through early September (Wahl 2005, Roby and Collis 2011, Washington Ornithological Society 2005-2011, and eBird 2013). Small numbers occur in the Strait of Juan de Fuca and Puget Sound from April through November. East Sand Island in the Columbia River estuary is the

largest known post-breeding night roost for California Brown Pelicans in the Pacific Northwest (Wright et al. 2012). Night roosts also exist in Grays Harbor, and intermittently in Willapa Bay during years when subtidal shoals become islands. Significant numbers are also observed roosting on rocky islands north of Grays Harbor, and many of these sites are probably also used as night roosts.

Historical range expansions and contractions along the Pacific coast have probably been related to long-term changes or cycles in ocean temperatures that affect prey abundance (Jaques 1994). Brown Pelicans were common in fall along Washington's coast during the 1800s, but rare during a period of cooler ocean temperatures from 1900-1920s, and increased again in the 1930s when warmer ocean temperatures returned. Post-breeding range again contracted south with cooling in the 1940s, but expanded north to Washington again in the 1970s, a trend that has continued, and probably been amplified by the recovery of the colonies in southern California (Wahl and Tweit 2000, Wahl 2005, Anderson et al. 2013).

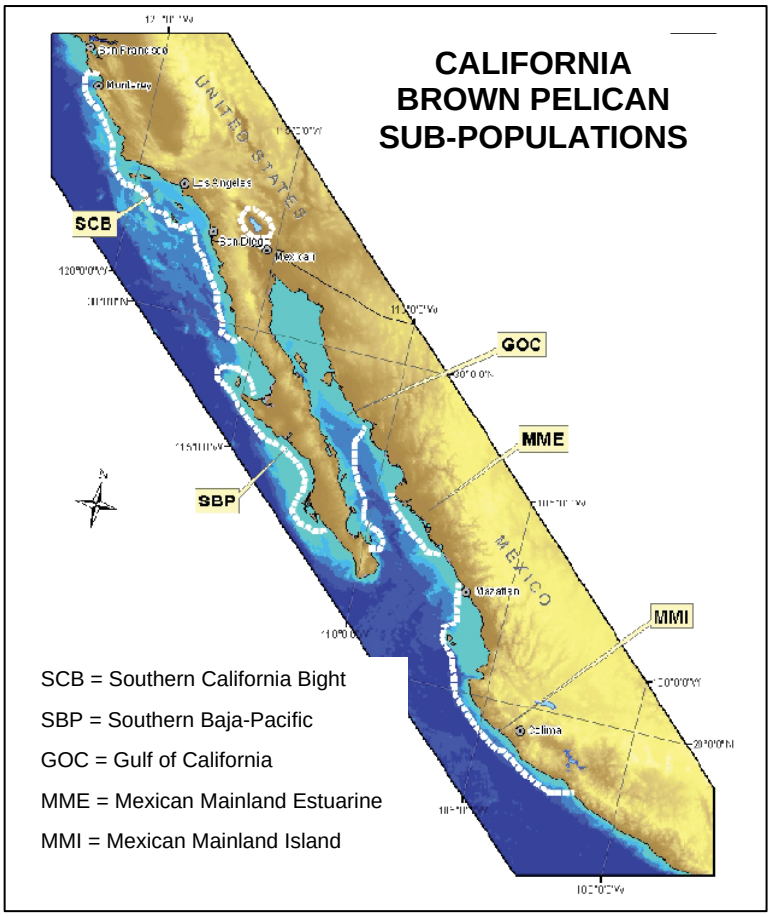

Figure 2. Breeding areas of sub-populations of the California Brown Pelican in California and western Mexico (From Anderson et al. 2007; used by permission of author).

NATURAL HISTORY

Brown Pelicans are a dark-plumaged pelican of marine habitats (Shields 2002). They are known for their head-first plunge-dives to capture fish within 2 m of the surface in their expandable gular pouch. Brown Pelicans will also seize prey while on the water surface, particularly in shallow water. They do not carry fish in their pouch, as is often believed, but rather swallow them upon capture (Shields 2002). Brown Pelicans feed primarily on schooling marine forage fishes, and although present in substantial numbers in the Columbia River estuary, they are not a major predator of migrating salmon smolts. As part of investigations of avian predation on salmon smolts in the lower Columbia River, Roby and Collis (2012) found no evidence that Brown Pelicans roosting on East Sand Island feed on salmon smolts. In California, Brown Pelicans feed primarily on Northern Anchovies, Pacific Sardines, and Pacific Mackerel.

Brown Pelicans typically nest in colonies on small offshore islands that are relatively free of human disturbance and predation by terrestrial mammals. Nesting is rather asynchronous, with timing related to

foraging conditions; in California, nesting can occur from December to August, with peaks of egg-laying most often from February through May (Anderson and Gress 1983). In the Gulf of California, nesting occurs from November to May (Shields 2002). Nests are built in trees, where available, or on the ground. The clutch of 2-3 eggs is incubated with warmth from the adult's webbed feet (Shields 2002).

Brown Pelicans are slow-maturing, not reaching sexual maturity until 3-5 years of age. They are also long-lived with the oldest individual on record living 43 years (Shields 2002).

HABITAT USE

Brown Pelicans forage in shallow (<150 m deep) waters, typically within 20 km of shore in prey-rich areas of upwelling (Briggs et al. 1983, Shields 2002). The large estuaries on Washington's southwest coast offer a variety of prey in abundance, including northern anchovy, sand lance, smelt, herring, and shad. Grays Harbor and Willapa Bay provide shallows that allow for surface feeding that may be helpful for young, relatively inexperienced pelicans, and these estuaries provide large undisturbed roost sites on sandbars and islands (Jaques 1994).

Roosting and loafing sites are important habitat for Brown Pelicans (Shields 2002). Pelicans cannot remain on the water for more than an hour as their feathers become water-logged, hindering thermoregulation. After feeding, birds roost out of the water while they dry and preen their plumage (Schreiber and Schreiber 1982, Jaques and Strong 2002, 2003). Pelicans gather in communal roosts often on artificial structures such as piers, breakwaters, and jetties, on islands and offshore rocks, and on beaches at the mouths of estuaries (Jaques and Strong 2002, 2003). Secure nocturnal roost sites are a critical resource for Brown Pelicans and usually occur on islands that provide a water barrier that inhibits disturbance by mammalian predators and humans (Jaques and Strong 2003).

Roosting habitat in Washington

In Washington, Brown Pelicans seasonally roost in substantial numbers at a few artificial structures and low sandy islands and exposed shoals in the Columbia River, Willapa Bay, and Grays Harbor estuaries (Jaques and O'Casey 2006, Wright et al. 2003). They also use many Olympic Peninsula sites, including several beaches and rocky islands off the coast.

East Sand Island, Oregon, in the Columbia River estuary is currently the largest night roost in the region (Fig. 3). Up to 16,000 Brown Pelicans have roosted there in recent years (Wright 2004,

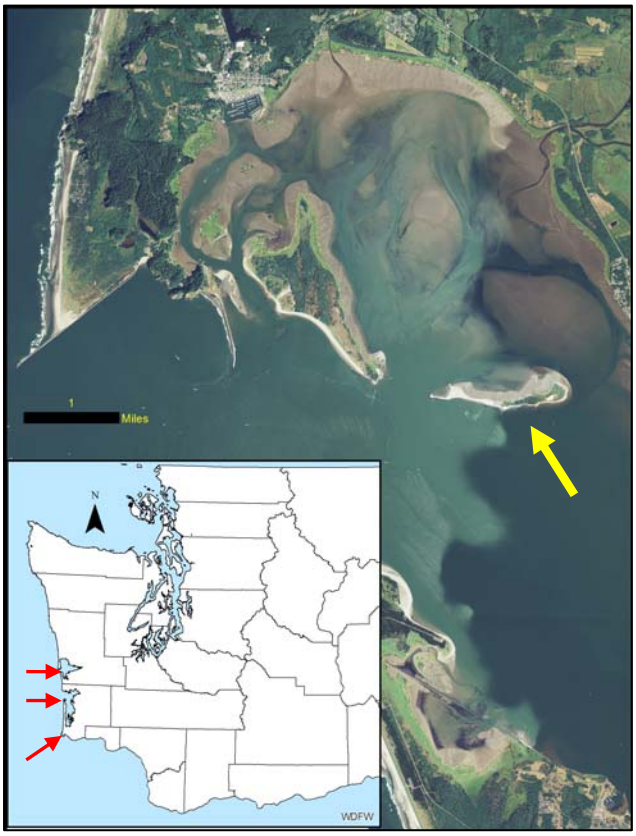

Figure 3. East Sand Island, Oregon, in the Columbia River estuary (yellow arrow), and locations of East Sand Island, Willapa Bay, and Grays Harbor (inset, red arrows, south to north).

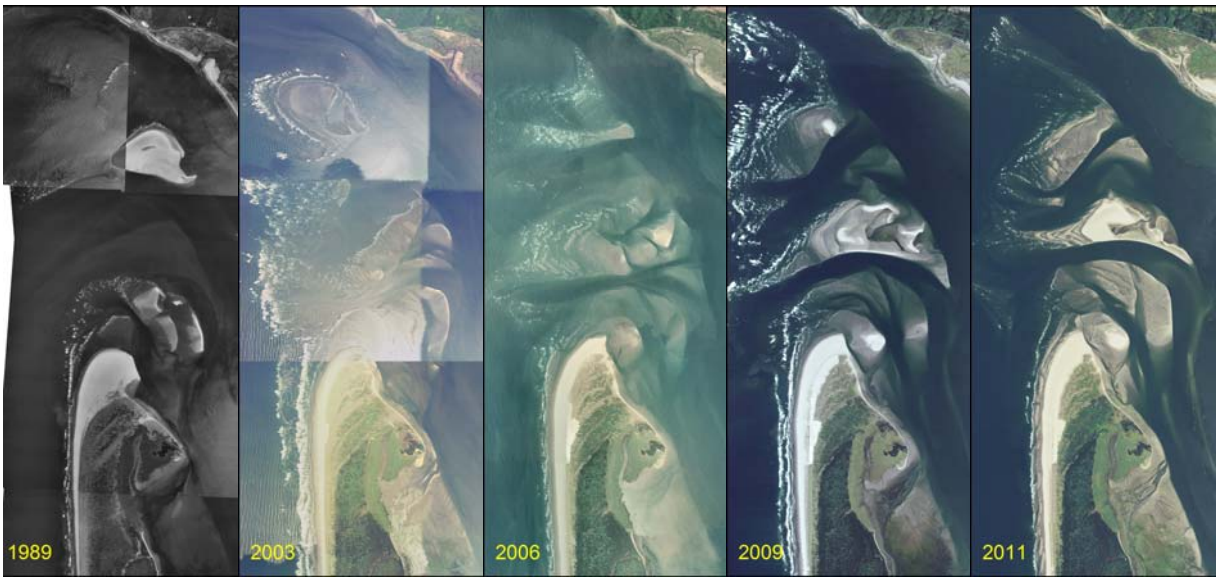

Figure 4. Changes in the islands and shoals north of Leadbetter Point at the mouth of Willapa Bay, Washington, 1989-2011. These islands have been intermittently used for roosting by Brown Pelicans.

Roby and Collis 2012). The island is about 21 ha in size and hosts large numbers of waterbirds, including Double-crested Cormorants (*Phalacrocorax auritus*), and Caspian Terns (*Hydroprogne caspia*) (Roby and Collis 2012). The island is owned by the U.S. Army Corps of Engineers and is closed to public access.

Willapa Bay has extensive sand shoals, and periodically has one or more islands between the north and south channels at the mouth of the bay (Fig. 4). The area was estimated to have 417 ac of sand above mean high water in 1990. During the period 1998-2005, day use of Willapa Bay by pelicans was correlated with availability of a night roosting site; about 500 pelicans used the bay in July and September 2005 (Jaques and O'Casey 2006). Gunpowder Island (also called Deadman, Sand, or Pelican Island; Speich and Wahl 1989 listed the north island as Whaleback) was a preferred roost from 1987-1998, but a construction and dredging project initiated to protect a highway (SR 105) apparently caused erosion and the island became intertidal by 1999; pelicans switched to the south island, but it too eroded and became an intertidal bar by 2001, eliminating night roosting in Willapa Bay (Lowe 1997, Wright et al. 2003). Brown Pelicans shifted to other sites for night roosting, primarily East Sand Island. There was no island above mean high water

Figure 5. Locations of Brown Pelican roost sites in Grays Harbor.

north of Leadbetter Point from 2001-2003, but a new island was forming at the north cove bar in 2004 and 2005, and the area was again used for night roosting (Jaques and O'Casey 2006).

Figure 6. Brown Pelicans on the breakwater at Westport, Grays Harbor County (*Photo by D. Jaques).*

During 2003-2005, 12 different roost sites were used by Brown Pelicans in Grays Harbor, including six natural sand islands or intertidal sandbars, two natural sandspits, and four artificial structures (Fig. 5; Westport breakwater, South Jetty, Pt. Chehalis groin, and an old dock; Jaques and O'Casey 2006). The two most consistently used roost sites in Grays Harbor were Sand Island and the Westport Harbor breakwater (Fig. 6; Jaques and O'Casey 2006). Sand Island was the most heavily used night roost during 2003-2005, with a single day high count of 3,200 pelicans in August 2005. The Westport Harbor breakwater was the most consistently used, but it had limited capacity; the peak count was 598 in July 2005; it is more heavily used during the day (peak day count of 679; Jaques and O'Casey 2006).

Brown Pelican numbers are higher in Grays Harbor during daylight, as some birds apparently commute from the night roost on East Sand Island in the Columbia River estuary. Whitcomb Flats, an intertidal shoal east of Westport Harbor, had a high count of 756 in August 2005. The South Jetty was used by up to 400 pelicans during the day in August and September, but it offers little protection from wind and large swells and is not used in windy weather. The Brown Point Jetty, on the north side of the Grays Harbor mouth has had as many as 1,200 roosting pelicans (1 Sept 2007; eBird 2013). Day roosts also included the eastern tip of Damon Point (mostly <100, high count of 386), and Airport Spit, south of Westport Harbor (mostly <100, high of 280); neither site is suitable for night roosting.

Figure 7. Locations of Grays Harbor, Willapa Bay, and the Columbia River estuary, and other important roost sites for Brown Pelicans in Washington.

North of Grays Harbor, Brown Pelicans have been recorded roosting in significant numbers (>200) at various beaches, and rocky islands (Fig. 7), including Grenville Arch, Split Rock (1,200 on 12 July 2011, eBird 2013), Willoughby Rock, Puffin Rock, Destruction Island (800 on 20 July 2011; eBird 2013), Rounded Island, LaPush vicinity (Rialto Beach, several islands; 1,300 reported 19 Sept 2008, WOSNews), Jagged Island, Carroll Island (2,700 on 19 July 2011, eBird 2013), Cape Alava, and beaches in and near Makah and Neah bays on either side of Cape Flattery (S. Thomas, Washington Maritime National Wildlife Refuge Complex; eBird 2013; Washington Ornithological Society 2005-2011).

POPULATION STATUS AND TREND

Brown Pelican: Range-wide Population

The total adult population of Brown Pelicans is estimated to include 101,300-104,500 breeding pairs; this does not include the Peruvian pelican (*P. o. thagus*), sometimes considered a separate species, which is estimated at 400,000 birds (Shields 2002). During the late 19th and early 20th centuries, pelicans were shot for feathers for the millinary trade and by the fishing industry in the southern U.S. With legal protections, restrictions on pesticides, and a reintroduction project in Louisiana, Brown Pelicans have recovered nationwide. Numbers in the U. S. may now exceed historical levels (Shields 2002).

California Brown Pelican

California Brown Pelicans declined dramatically in the 20th century as a result of DDT contamination (Shields 2002). During the late 1960s and early 1970s, the Southern California Bight (SCB) population declined to fewer than 1,000 breeding pairs and reproductive success was nearly zero (USFWS 2009). Populations of California Brown Pelican in Mexico have been relatively stable since studies began in the early 1970s, in part because of their lower exposure to organochlorine pesticides (e.g., DDT), although annual numbers at individual colonies fluctuate widely due to changes in prey availability and human disturbance at colonies (USFWS 2009).

The SCB population recovered after the banning of most uses of DDT in 1972 and the cessation of discharge of wastes contaminated with DDT and derivatives off the California coast. In 2006, approximately 11,700 breeding pairs were documented at 10 locations in the SCB (Anderson et al. 2013). The population estimate for the entire California Brown Pelican subspecies in 2006 was about 70,680 ± 2,640 breeding pairs (mean ± SD); when juvenile and subadult birds are taken into account the overall total population estimate is 195,900 ± 7,225 birds (Anderson et al. 2013).

The SCB population has been relatively stable and healthy. Although productivity over the last 20 years has improved since the time of federal listing, it became apparent that the productivity target for delisting in the California Brown Pelican Recovery Plan (USFWS 1983) was probably too high to be attainable (Burkett et al. 2007, USFWS 2007). On West Anacapa Island, the largest colony in the SCB, productivity now meets or exceeds the objective for down-listing of maintaining a five-year mean of 0.7 young fledged per nesting attempt, but has rarely achieved the 0.9 standard originally targeted for delisting (Burkett et al. 2007).

The primary objective of the Recovery Plan was to restore and maintain stable, self-sustaining populations throughout this portion of the species' range (USFWS 1983). The delisting criterion for the SCB population of at least 3,000 breeding pairs has been exceeded every year since 1985, with the exception of 2 years (1990, 1992), and has exceeded 6,000 pairs most years. The Brown Pelican

populations that were still listed (California subspecies and Gulf of Mexico) were removed from the federal Endangered Species List in 2009 (USFWS 2009a). A draft post-delisting monitoring plan was issued (USFWS 2009b), but it has not been finalized or implemented.

Abundance in Washington. There is little historical information on Brown Pelican numbers in Washington, but the numbers that disperse from breeding areas and are observed in Washington have apparently varied greatly over time due to factors discussed below. David Douglas observed "many" at Cape Disappointment at the mouth of the Columbia River in July 1825 (Jewett et al. 1953), and their numbers were "surprisingly great" in 1857 when J. G. Cooper reported "large flocks" in Shoalwater (Willapa) Bay from about 1 September until November (Suckley and Cooper 1860). Lawrence (1892) noted that in the fall, they were "pretty common" in Willapa Bay and "not uncommon" in Grays Harbor. Dawson and Bowles (1909) noted that members of the Quillayute tribe pointed out a rock off Cape Johnson (north of La Push in Clallam County) where 100 or more would sometimes roost. There were fewer reports in the mid-20th century, when their non-breeding range retracted southward (Jaques 1994). Kitchin (1930) did not record Brown Pelicans among bird species recorded at Westport, Grays Harbor County, in September 1930, but Balmer (1938) observed ten on 15 September 1936. Most Washington records were of small numbers or single birds, "except possibly from Willapa Bay south" (Wahl 2005). By the 1960s, even single birds in Washington were noteworthy (Wahl 2005). Based on observations from 1966-1979, Hoge and Hoge (1980) listed Brown Pelicans as a "rare visitor from mid-August to mid-October" at Ocean Shores, Grays Harbor County.

California Brown Pelicans began expanding their non-breeding range northward again in the early 1970s (Jaques 1994). There was a record influx during the El Niño year of 1976, when 200 were observed in the vicinity of the Columbia estuary (Jaques 1994). The 1982-83 El Niño event brought another influx, with ~1,000 pelicans reaching Willapa Bay, but the annual migration to the Pacific Northwest involving thousands did not begin until 1985 (Jaques 1994). From 1976 to 1990, their non-breeding range expanded north ~260 km from Tillamook Bay, Oregon, to Rounded Island, Washington (Jaques 1994).

Annual aerial surveys conducted during September by USFWS refuge personnel from 1987-1997 recorded from 922 (1987) to 7,613 birds in Washington each year (Fig 8; USFWS data); from 2007-2014, the counts varied from 1,523-11,308, but only 2010 included Jefferson and Clallam counties (2,035 pelicans were counted in Jefferson and Clallam in 2010). Pacific Northwest coast totals from Smith River, Del Norte County, California, north to Grays Harbor, Washington, increased from 4,522 in 1987 to a high of 18,769 in 2007. September counts have declined dramatically since 2011; the 2014 count, 3,416 was the lowest since survey began (Stephensen and Szumski 2013, Stephensen and Ebert 2014). However, the low tide and wind conditions during the morning survey suggested many birds were foraging offshore and not detected. Technicians on East Sand Island noted 1,000s of pelicans foraging in the estuary, long strings headed south towards Fort Stevens, Oregon, and counting birds until last light resulted in a total of 9,960 on East Sand Island.

Numbers of pelicans roosting on East Sand Island increased sharply from less than 100 during 1979-1986, to high counts of 10,852 in 2002 (Wright 2004), 12,395 in 2008, over 16,000 in 2009, 11, 500 in 2010, 14,224 in 2011, and 10,570 in 2012 (Roby and Collis 2012). The peak count for 2013 was only 3,838 on 7 and 20 August (P. Loschl, pers. comm. *cited in* Stephensen and Szumski 2013), but was back up to 10, 690 on 21June and 1 July in 2014. Pelican numbers often peak in late July or August. Annual September aerial counts by USFWS refuge personnel peaked in 2011 at 12,887 (Fig. 9). The East Sand Island roost has been the largest known non-breeding aggregation of California Brown Pelicans in the Pacific Northwest, if not throughout their range. In 2008, breeding behavior by Brown Pelicans roosting on East Sand Island (i.e., courtship displays, nest-building, attempted copulations) was observed, but

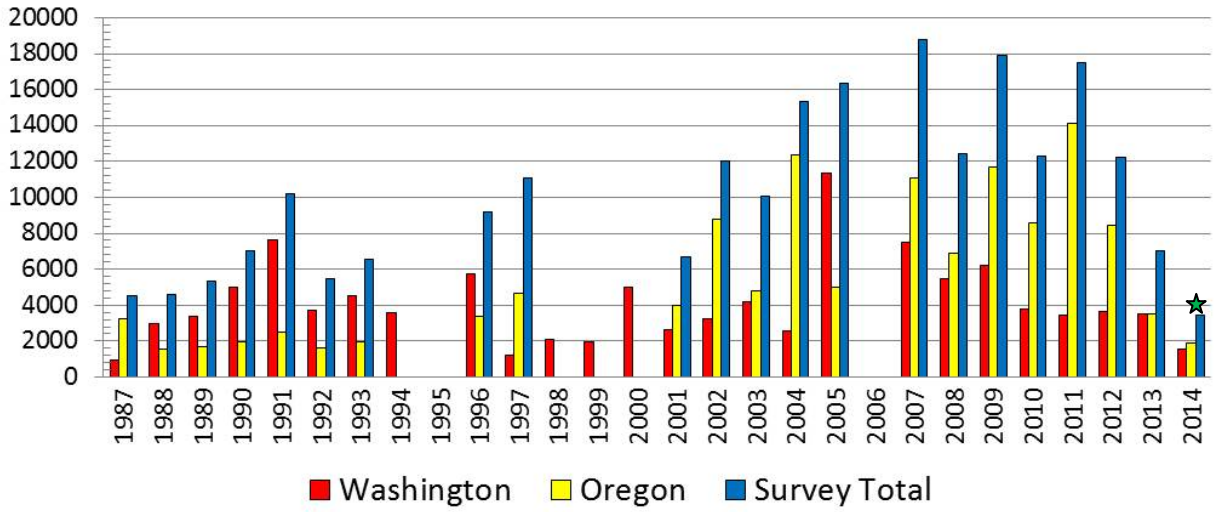

Figure 8. Brown Pelicans counted during aerial surveys of the outer coast of Washington, Oregon, and Del Norte County, California by USFWS, September 1987-2014 (no survey was done/data not available for 1995 and 2006; only Washington and the Columbia estuary was surveyed in 1994, 1998, 1999, and 2000; surveys did not include Del Norte County in 2001, 2005, 2012, and 2013; survey route included Jefferson County in 1988, and Jefferson and Clallam County in 1990-1997 and 2010; ★ see text about 2014 data; Jaques 2001; Stephensen and Szumski 2013; Stephensen and Ebert 2014; USFWS data).

there was no evidence of egg-laying (Collis and Roby 2009). In July 2013, three birds laid eggs in nests on East Sand Island, but all three nesting attempts failed to produce hatchlings; 6-11 nests were built in June 2014, but all were abandoned (Bird Research Northwest 2013, 2014).

It is not clear how much the recovery of the SCB subpopulation affected pelican numbers occurring in Washington. Natural variations and cycles in ocean conditions can dramatically affect availability of the

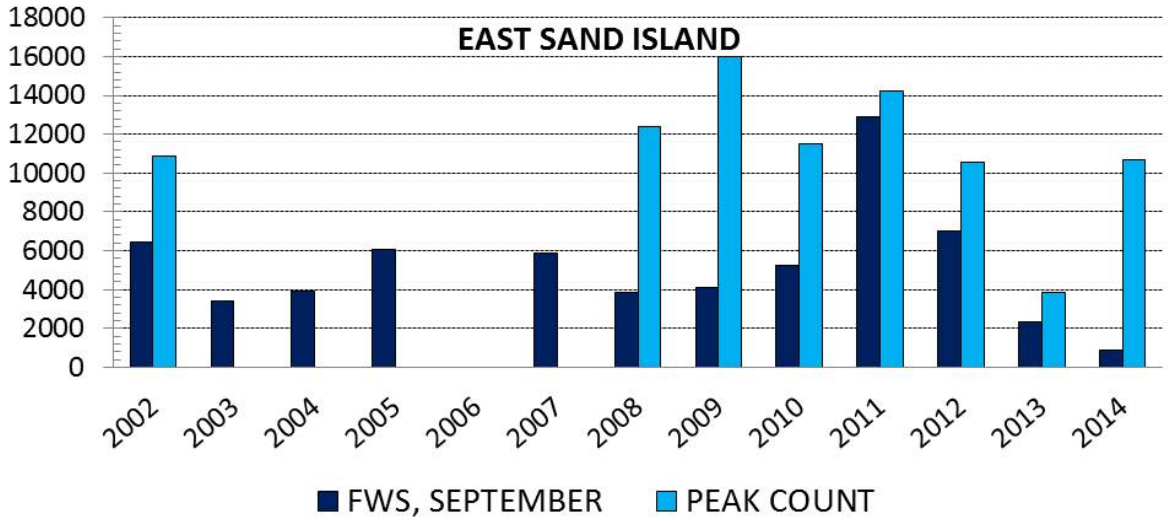

Figure 9. Number of Brown pelicans counted by USFWS during early September aerial surveys and peak annual surface-based counts of East Sand Island, Oregon, 2001-2014 (see ★ note in text about 2014 aerial survey data; Wright 2004, Roby and Collis 2012, Stephensen and Szumski 2013, Bird Research Northwest 2014).

schooling fishes that pelicans eat. The southward retreat and subsequent northward expansion appear to be unrelated to the SCB population collapse caused by DDT contamination. Jaques (1994) noted that the 20th Century southward retreat occurred long before DDT contamination became an issue in the 1950s, and the northward return began in the early 1970s at a time when the SCB population was at its' lowest.

Many Brown Pelicans defer breeding during El Niño events when the normal pattern of upwelling of nutrient-rich water is disrupted, affecting availability of forage fish. During those years, pelicans generally occur in larger numbers along the coast of northern California, Oregon, and Washington (Ainley et al. 1995). Jaques (1994) suggested that the El Niño events of 1976 and 1982-83 led to one or more cohorts of pelicans "discovering" the favorable habitat and foraging conditions available, including the northern stock of anchovy, and the large shallow estuaries with multiple roosting sites. Heermann's Gull (*Larus heermanni*) and Elegant Tern (*Sterna elegans*), both southern warm-water species that also feed on anchovies, exhibit a similar pattern of episodic influxes during El Niño events and increased presence in the Pacific Northwest with the recent trend toward warmer ocean temperatures (Jaques 1994, Wahl and Tweit 2000, Wahl et al. 2005, Merrifield 2003a, b).

In addition to the effect of El Niño events, multi-decade cycles in ocean temperature and conditions affect prey availability (see *Prey availability*) that result in changes in Brown Pelican numbers in the Pacific Northwest (Jaques 1994, Wright et al. 2007). For example, an abrupt increase in sardines occurred in the Pacific Northwest in 1992 associated with the 1992-93 El Niño, and they began spawning in Pacific Northwest waters (Emmett et al. 2005). This change in abundance followed an apparent ocean regime shift in 1989 (Emmett et al. 2005). That pattern may have reversed in the last few years, as sardines have been declining (Zwolinsjki and Demer 2012), and fewer pelicans have been observed on Northwest coasts (Figs. 8, 9), while large numbers were reported feeding on abundant anchovies in Monterey Bay, California (Houston 2013).

FACTORS AFFECTING BROWN PELICANS

Adequacy of Regulatory Mechanisms

Federal protection. The Brown Pelican was listed as endangered by the U. S. Fish and Wildlife Service under the Endangered Species Act in 1970. The species was delisted in Florida, Alabama, and along the Atlantic coast of the United States in 1985 (USFWS 1985). Brown Pelicans on the Gulf of Mexico and Pacific coasts, including the California Brown Pelican, were delisted in 2009 (USFWS 2009). Brown Pelicans are still protected from 'take' by the federal Migratory Bird Treaty Act, and the nesting colonies in California are relatively protected from disturbance in Channel Islands National Park. Although oil spills and contaminants could affect Brown Pelicans, regulations

State status. In Washington, Brown Pelicans have been state listed as endangered since a list was first established in 1980. If or when delisted in Washington, Brown Pelicans would still be protected as 'protected wildlife' (WAC 232-12-011 (3); see Appendix A). Human-caused mortality is not known to be a significant factor affecting pelican numbers in Washington. Ocean conditions that affect prey availability seem to be the main factor affecting pelican numbers.

Prey Availability

California Brown Pelicans feed on forage fishes, such as Northern Anchovies, Pacific Sardines, and Pacific Mackerel (Shields 2002). There are no diet data for Brown Pelicans in Washington, but incidental

observations of prey captured have mostly been anchovies (Jaques 1994). Also, the recent increase in the seasonal abundance of pelicans has followed a dramatic increase in sardines and anchovies. In the Southern California Bight, when anchovies are the most abundant fish, their availability within foraging distance of colonies is the most important factor influencing pelican breeding success (Anderson et al. 1982). The California Brown Pelican experiences breeding failures during years of El Niño weather patterns, when warmer waters become unsuitable for their major food sources, especially anchovies (Hayward 2000, Shields 2002). In extremely strong El Niño years, mortality of adult pelicans can result (Anderson et al. 1982, Shields 2002). El Niño-caused impacts are generally limited to a single breeding season, however, and do not result in long-term population declines. The pelican is a long-lived species that has evolved with natural phenomena such as variation in food resources, winter storms, and hurricanes, such that sporadic breeding failures have little effect on long-term population stability (Shields 2002). In contrast to the pelicans in the Southern California Bight, pelicans in the Gulf of California feed opportunistically on at least 30 fish species with no single species dominating. In the nonbreeding period, Brown Pelicans will feed on any abundant surface dwelling fish species.

Forage fish species available in Washington include Pacific Herring (*Clupea pallasii*), various smelt (family Osmeridae), Pacific Sand Lance (*Ammodytes hexapterus*), Northern Anchovy, and Pacific Sardine (Lowry 2013). Populations of forage fish are characterized by cyclical periods of abundance in response to changes in oceanic conditions (e.g. El Niño, La Niña, decadal oscillations) (Brodeur et al. 2005, Auth et al. 2011, Crone et al. 2011).

Pacific Sardines. The Pacific Sardine supported the largest fishery in the western hemisphere during the 1930s and 1940s, with landings in British Columbia, Washington, Oregon, California, and México (Hill et al. 2011). Sardines were among the most abundant forage fish off the outer Washington coast and supported a large commercial fishery until stocks collapsed in the 1940s (Bargmann 1998). Both sardine and anchovy populations tend to alternate in abundance over periods of roughly 50-60 years, although sardines have varied more dramatically than anchovies (Chavez et al. 2003, Hill et al. 2011). During the 1950s to 1970s, a period of reduced stock size and unfavorably cold sea surface temperatures, the stock apparently abandoned the northern portion of its range, and sardines did not occur in commercial quantities north of Baja California. The 1947 collapse of the sardine stock occurred during a time of very heavy fishing pressure and several successive years of low reproductive success (Bargmann 1998). In recent decades, the combination of increased stock size and warmer sea surface temperatures resulted in the stock re-occupying areas off Central California, Oregon, Washington, and British Columbia (Hill et al. 2011). Sardines went from being nonexistent to one of the dominant pelagic species in the northern California Current in the span of slightly more than a decade (Emmett et al. 2005). In British Columbia, sardines re-appeared in 1992, after an absence of 45 years (McFarlane and Beamish 2001). In Washington, an experimental purse seine fishery for Pacific Sardine began in 2000. From 2000 to 2011, catch varied from 4,362 –15,820 metric tons. In 2009, this fishery was passed into rule as a permanent, limited-entry fishery.

Figure 10. Pacific Sardines.

Zwolinski and Demer (2012) reported that the oceanographic conditions in the north Pacific had shifted to a colder period and that Pacific Sardine biomass had declined precipitously in the California Current. They noted parallels of indices of current oceanographic conditions with those during the historical collapse of the sardine fishery in the 1940s and predicted an imminent collapse. The sardine fishery on the British Columbia coast apparently did collapse in 2013 (Pynn 2013). Washington landings in 2013, saw a decrease of 17% from 2012, and landings for California, Oregon, and Washington combined were down 37.9% from 2012 (CDFW 2014). During the winter of 2013/2014, the California current system underwent a major phase change (Leising et al. 2014); the Pacific Decadal Oscillation changed to positive values, indicative of warmer waters in the North Pacific, which may indicate sardines will rebound in the next few years. Indicators suggest a moderate El Niño during 2015.

Figure 11. Anchovy school (NOAA, Southwest Fisheries Science Center).

Northern Anchovy. Northern Anchovies generally occur within 18 mi (30 km) of the shore and form tightly packed schools typically found near the surface. Historically, anchovies were considered abundant off the outer Washington coast into the 1890s and then declined sharply (Bargmann 1998). Like sardines, however, anchovies appear to have made a modest comeback. They are subject to a large fishery off of California and Mexico. In Washington, anchovies are caught only in a small fishery for bait centered off the Columbia River, and a small scale purse seine fishery out of Westport (Bargmann 1998, Litz et al. 2008, L. Wargo, pers. comm.). The bulk of the anchovy population is well offshore. During the summer months, anchovies may be found in Grays Harbor, Willapa Bay, and the Columbia River mouth. The abundance of anchovies in these inshore areas varies from year to year but this variation appears to be due to changes in behavior, not changes in abundance (Bargmann 1998).

Northern Anchovy and Pacific Sardine populations have been observed to fluctuate out of phase with each other, with sardines more productive during warm phases of multi-decadal oscillations, and anchovies more productive during cold phases (Chavez et al. 2003). However, both Northern Anchovy and Pacific Sardine populations (and other forage fish populations) increased off Oregon and Washington after 1999 (Emmett et al. 2005, Litz et al. 2008). Recently, although California saw a 141% increase in landings, primarily in Monterey Bay during 2013 compared to 2012, landings were down in Washington and Oregon, and the three states combined (CDFW 2014).

Pacific Mackerel. Pacific Mackerel experience cyclical 'boom-bust' periods of abundance, similar to many other forage fish. In the northeastern Pacific, they range from southeastern Alaska to Banderas Bay (Puerto Vallarta), Mexico, including the Gulf of California, but are most abundant south of Point Conception, California (Crone et al. 2011). Over the last two decades, the stock appears to have more fully occupied the northern portions of its range along Pacific Northwest coasts in response to a warm oceanographic regime. Pacific Mackerel supported one of California's major fisheries during the 1930s and 1940s and more recently, particularly in the 1980s and 1990s. In 2013, California reported an increase of 124% in landings of Pacific Mackerel over 2012, while Oregon reported a 75% decrease. Washington did not report any landings of Pacific Mackerel in 2013 (CDFW 2014). Zwolinski and Demer (2012) suggested the change in ocean regime may include a shift in the biomass of pelagic fishes

to one dominated by Jack Mackerel (*Trachurus symmetricus*) followed by an increase in Northern Anchovy and then Pacific Mackerel. Commercial landings of Jack Mackerel jumped in California in 2013, and in Oregon in 2012 and 2013 (CDFW 2014). Washington did not report any landings of Jack Mackerel.

Pacific Herring. Pacific Herring spawn in the coastal embayments of Willapa Bay and Grays Harbor, and possibly the Columbia River estuary (Stick and Lindquist 2009). Little is known about these coastal herring populations. Initial documentation of spawning activity for Grays Harbor occurred in 1998 and has been monitored only intermittently, and not since 2005. Herring spawned in coastal locations are likely components of large summer herring aggregations that concentrate in coastal offshore areas (Stick and Lindquist 2009). The rules allow for herring to be fished as a target species, with a limited entry license, in Willapa Bay or Grays Harbor, but there is no active fishery, and herring are landed incidentally to the anchovy fishery (L. Wargo, pers. comm.).

Potential impact of commercial fisheries. Commercial fishing has the potential to negatively affect prey availability for seabirds. Anderson and Gress (1984) described the potential impacts of the anchovy fishery on Brown Pelican reproduction in southern California; they noted that prior to 1979, pelican reproduction and fishery catch tracked anchovy abundance. They also speculated that reduced reproductive success and breeding population at Los Coronado Island may have resulted from an increasing and unregulated Mexican anchovy fishery (Anderson and Gress 1984). Cury et al. (2011) examined long-term trends in breeding success of 14 seabird species in the Pacific, Atlantic, and Southern Oceans and abundance of forage fish. They reported that there appeared to be a threshold of one-third of the maximum prey biomass observed in long-term studies, below which seabirds exhibit reduced and more variable productivity. Cury et al. (2011) suggested maintaining one-third of the maximum observed biomass of prey species as a management guideline. Smith et al. (2011) suggested leaving 75% of the unfished forage fish biomass in the ocean to maintain ecosystem function. Pikitch et al. (2012), who conducted an extensive review of forage fish management, indicated that conventional management can be risky for forage fish because it does not adequately account for their wide population swings and high catchability. They recommended cutting catch rates in half in many ecosystems and doubling the biomass of forage fish left unharvested, compared to conventional management targets (Pikitch et al. 2012).

In Washington, commercial fisheries currently exist for herring, Surf Smelt, anchovy (largely inactive), and sardine, and recreational fisheries exist for herring and surf smelt (Lowry 2013). By law, Pacific Sand Lance cannot be fished commercially in an effort to ensure adequate forage fish are available to meet ecosystem needs. It does not appear that recent harvest levels have been negatively affecting Brown Pelicans in Washington, since their numbers have increased dramatically during the last 20 years, perhaps in response to the increase in sardines. However, excessive harvest during declines may affect the time required for stocks to rebound (Zwolinski and Demer 2012).

WDFW is currently involved in a regional effort by the Pacific Fishery Management Council (PFMC) to re-evaluate forage fish management practices and research priorities. The PFMC recently released a draft Fishery Ecosystem Plan (PFMC 2013). The plan is an informational, not prescriptive, document the purpose of which is, "*to enhance the Council's species-specific management programs with more ecosystem science, broader ecosystem considerations and management policies that coordinate Council management across its Fishery Management Plans and the California Current Ecosystem*."

The PFMC has used a conservative approach to harvest management of forage fish (coastal pelagic species), such as sardines, in response to their ecological role as prey and importance to West Coast fisheries, frequently reviewing new science in support of stock assessments and management strategies

because of the annual variability that can occur in the biomass of forage fish. In the late-1990's, the PFMC chose a conservative harvest rule for Pacific Sardine oriented toward maximizing biomass versus maximizing catch. The rule contains a temperature parameter as a proxy for many environmental conditions influencing sardine productivity, reducing sardine harvest in cooler regimes (CPSMT 2013). Because of this, annual harvest levels do not exceed 12% of the estimated biomass for that year. Harvest rules for coastal pelagic species, including sardines, anchovies, and other forage fish, have used a "cutoff" parameter to protect core spawning populations and prevent stocks from becoming overfished (PFMC 2013, p. 93-94). Beginning in 2014, the National Marine Fisheries Service began issuing annual state of the ecosystem reports for the California Current to support ecosystem-based management processes (NMFS Northwest and Southwest Fisheries Science Centers 2014) .

The U.S. Fish and Wildlife Service concluded that current levels of commercial fishing were not likely to endanger the Brown Pelican (USFWS 2009). In the U.S., regulations under authority of the Magnuson-Stevens Fishery Conservation and Management Act are sufficient to protect prey abundance for Brown Pelicans, including prey species currently being commercially fished and any that may be in the future (USFWS 2009). Long-term protection of food supplies has been addressed through the Coastal Pelagic Species Fishery Management Plan (Pacific Fishery Management Council 2011), which should ensure that adequate forage reserves are available to Brown Pelicans and other species along the U.S. Pacific Coast. The U.S. Fish and Wildlife Service suggested that Brown Pelicans would respond to changes in prey biomass due to commercial fishing or climate factors by switching to feed on other fish species (USFWS 2009).

Recent response of Brown Pelicans to changes in prey availability. Ocean conditions for 2010-2013 all pointed to a cooler regime, and the northern California Current Ecosystem has had a reduction in abundance of several forage fishes, including sardine, herring, and whitebait smelt (NMFS Northwest and Southwest Fisheries Science Centers 2014). Brown Pelicans in California and Oregon have been affected by the recent decline in abundance and availability of sardines. In 2010, wildlife rehabilitation centers in California were filled with emaciated pelicans (The Associated Press, 28 November 2013). In Oregon that year, "dozens" of pelicans starved and a rehab center in Astoria was caring for 100, and an unusual number lingered on the Oregon coast into the winter instead of migrating south (Terry 2010). During 2010-2012, Brown Pelicans showed the unusual behavior, of raiding Common Murre (*Uria aalge*) nesting colonies in Oregon, shaking chicks to feed on the regurgitated fish (The Associated Press, 28 November 2013); this behavior was purportedly related to nutritional stress due to the dramatic decline in sardines. Fewer pelicans migrated north to Oregon and Washington in 2013, apparently in part because many remained in Monterey Bay, on the central California coast, to feed on abundant anchovies (Houston 2013). Peak numbers at East Sand Island were back up to >10,000, but the September counts continued the decline which began after 2011. The very recent phase change to warmer waters may signal a rebound of sardines and, consequently, Brown Pelicans in the next few years.

Habitat Protection

All pelican nesting colonies in California are within Channel Islands National Park and are protected from development. California Brown Pelican nesting colonies in Mexico are protected from habitat destruction and modification because the nesting islands are federally protected and designated as either Biosphere Reserves or Natural Protected Areas (USFWS 2007).

In Washington, most coastal sand bars, offshore rocks, etc., are part of the Willapa National Wildlife Refuge, Washington Maritime National Wildlife Refuge Complex (including Copalis, Quillayute Needles, and Flattery Rocks National Wildlife Refuges), Olympic National Park, or various state wildlife

areas and parks. East Sand Island is owned and managed by the Army Corps of Engineers, and although Brown Pelican roosting has not been reported upriver from East Sand Island, many lower Columbia River islands are part of the Lewis and Clark or Julia Butler Hanson National Wildlife Refuges. Some of these islands, including Miller Sands, Rice, Lois, and Mott islands were created with dredged material (Fox et al. 1984); dredged material deposition has increased the number of islands and expanded the area of potential roost sites for pelicans and other birds.

Disturbance of Nesting and Roosting Sites

Disturbance-free roosting habitat is essential for Brown Pelicans for drying their feathers, resting, sleeping, and conserving energy. Night roosts need to be larger and less accessible to predators and humans than day roosts (Jaques and Strong 2002). Conserving energy seems to be an important life history trait of Brown Pelicans; they spend much of their daily energy budget resting and maintaining plumage at roosts (USFWS 1983, Croll et al. 1986). Chronic disturbance to nonbreeding Brown Pelicans can affect body condition, metabolic rate, habitat use, and subsequent reproductive success and survival due to reduced fat reserves (Wright et al. 2012).

Many pelican roosts are vulnerable to human disturbance. Over 90% of disturbance incidents at Brown Pelican roosts in California were due to humans, including walkers, fishermen, dogs, surfers, kayakers, jet skiers, and helicopters, rather than natural factors (Jaques and Strong 2002). Jaques and Strong (2002) indicated that disturbances at natural areas may be incurring relatively high energetic costs to pelicans and affecting use of otherwise desirable roosting sites. They recommended management intervention on natural areas to reduce disturbance, such as fencing, buoys, education, and the creation of additional islands.

In Washington, pelicans roosting on state beaches are often subject to disturbance. The hard-packed wet sand of several ocean beaches is legally considered part of the highway system, with a speed limit of 25 mph. Roosts accessible to foot traffic are also somewhat susceptible to human disturbance. Jaques and O'Casey (2006) indicated that pelicans in Grays Harbor and Willapa Bay were habituated to boat traffic passing nearby and that Bald Eagles (*Haliaeetus leuocephalus*) were the most frequent cause of disturbance.

East Sand Island in the Columbia River estuary is closed to the public, but infrequent visits by beachcombers and birdwatchers do occur (Wright et al. 2007, 2012). Disturbance by humans on the island (mostly related to research on cormorants and Caspian Terns) was negatively associated with total pelican numbers, whereas water-based human disturbance had no significant effect on total pelican numbers on the island (Wright et al. 2007). Natural disturbances, primarily by Bald Eagles, were more frequent than human disturbances, but apparently did not influence the total number of pelicans on the island.

Some potential roosting sites on Columbia River islands are used for deposition of dredged material. Dredged material deposition may affect Brown Pelican roost sites by altering habitat or disturbing birds, but negative impacts would likely be temporary, and there is a long term positive effect if additional roosting area were created. The biological assessment for the Columbia River estuary channel improvements project concluded there would be "no effect" on Brown Pelicans (USFWS 2002).

Brown Pelicans sometimes become habituated to nearby intense uses, such as frequent aircraft activity (Schreiber et al. 1981) or boat traffic (Jaques and Strong 2002). Current levels of human disturbance are not sufficient to cause population declines, because Brown Pelicans become habituated to some level of

disturbance, may shift nesting locations, or may only experience a temporary loss of reproduction, such as for a single breeding season (USFWS 2009). The U.S. Fish and Wildlife Service concluded that roost site disturbance was not having a major adverse effect on California Brown Pelicans throughout their range (USFWS 2009).

Pesticides

Although pesticide contamination is not currently known to be having population level effects on California Brown Pelicans (USFWS 2009), Brown Pelicans are sensitive to bioaccumulation of contaminants that occur in their prey. Population declines in the 20th century were related to the accumulation of residues of DDT, as well as other organochlorine pesticides. DDE, a DDT metabolite, altered calcium metabolism in pelicans that resulted in thin eggshells that were easily broken during incubation, which led to widespread reproductive failure (Shields 2002). In California, ocean sediments off the coast of Los Angeles were heavily contaminated with DDT from a manufacturing facility that discharged waste into the sewage system and ultimately, the marine environment (USFWS 2009). This input ceased in 1970, after which DDT residues in pelican prey decreased. Eggshell thinning related to DDE has lessened over time and is no longer causing population-wide reproductive impairment in Brown Pelicans.

DDT was approved for use in Mexico until 2000. Recent contaminant studies in the Gulf of California, Mexico, indicate contamination in this area is low (USFWS 2009). Nonetheless, recent soil samples taken in southern Sonora had high levels of DDE/DDT residues and may indicate more recent applications despite the ban (USFWS 2013).

Excessive exposure to other organochlorine pesticides has been implicated in regional Brown Pelican declines elsewhere in the species' range (USFWS 2007). The pesticide endrin is the probable cause of the Brown Pelican's rapid decline and subsequent disappearance in Louisiana (King et al. 1977). This chemical is no longer registered for use in the U.S. or Canada (*http://www.pesticideinfo.org*). During 1975, endrin appeared to kill more than 300 of a reintroduced population of 465 Brown Pelican in Louisiana; brain tissue samples from these birds contained seven pesticides, including lethal levels of endrin (USFWS 2009).

Dieldrin was also reported at levels considered detrimental to reproduction in Brown Pelicans in the southeastern U.S. during the 1970s (USFWS 2009). The agricultural use of dieldrin in the U.S. ceased in 1970 and it was discontinued as a termite control in 1987 (USFWS 2009).

Oil Spills

Oil spills and oil pollution remain a potential threat to Brown Pelicans. For example, 932 oiled Brown Pelicans were picked up on the coast of the Gulf of Mexico after the BP Deepwater Horizon disaster in 2010 (Fig. 12), and many more pelicans may have been killed or sickened and never counted (Center for Biological Diversity 2011). More than 350 Brown Pelicans were collected dead, or alive for rehabilitation, after 14 oil spills that occurred in California waters from 1990-2007 (Burkett et al. 2007). Anderson et al. (1996) concluded that rehabilitation did not return oiled Brown Pelicans to breeding condition or normal survivability during the 2 years that they were monitored by telemetry following rehabilitation.

Major ports exist in Puget Sound, Grays Harbor, and the Columbia River, and every year, more than 15 billion gallons of oil is transported through Washington by vessel, pipeline, railcar, and truck

(Washington Department of Ecology 2012). Oil transport included 750 transits by tank ships (55 in the Columbia River), and 4,134 transits by barge (Washington Department of Ecology 2013). Jaques and O'Casey (2006) noted several Brown Pelicans with fresh oil spots during June 2004 at roosts in Grays Harbor. The freshness of the oil suggested a small local spill or leak in Westport Harbor.

Figure 12. Oiled Brown Pelicans after the BP Deepwater Horizon disaster (*Photo from International Bird Rescue Research Center*).

Neel et al. (1997) listed 13 oil spills involving vessels in Washington waters between 1972 and 1996. Among these, three spills had potential to impact Brown Pelicans: the tank vessel *Mobil Oil,* which grounded on Warrior Rock in the Columbia River in March 1984, leaking 200,000 gallons of heavy oil; the fuel barge *Nestucca,* which spilled 231,000 gallons of heavy fuel oil near the entrance to Grays Harbor in December 1988; and the fishing vessel *Tenyo Maru,* which sank approximately 20 miles northwest of Cape Flattery after a collision with another vessel in July 1991. The *Tenyo Maru* initially leaked a large amount of oil (est. 100,000 gal), and for more than a month after the collision, an undetermined quantity of oil leaked from the sunken vessel. The heaviest oiling occurred along the Makah Indian Reservation and the Olympic National Park shoreline. No Brown Pelicans were reported among the oiled birds observed or recovered dead after the *Tenyo Maru* or *Nestucca* spills (Tenyo Maru Oil Spill Natural Resource Trustees 2000, USFWS 2004) , and the *Nestucca* spill occurred in December, when few pelicans are present. No record was found of birds recovered after the *Mobil Oil* spill.

The threat of oil spills has been alleviated in the U.S. to some degree by stringent regulations for extraction equipment and procedures, improved tanker safety, and improvements in oil spill response, containment, and cleanup (Ramseur 2012). Tanker and barge spill rates have declined in recent decades; major regulatory changes in the early 1990s substantially eliminated the use of single-hull tankers by requiring double hulls or their equivalent (McMahon Anderson et al. 2012). When an oil spill occurs in the United States, the Natural Resource Damage Assessment (NRDA) process is in place to identify the extent of damage to wildlife and other natural resources, the best methods for restoring those resources, and the type and amount of restoration required. The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (42 U.S.C. 9601 *et seq.*), the Oil Pollution Act of 1990 (33 U.S.C. 2701), and the Federal Water Pollution Control Act or Clean Water Act, as amended (33 U.S.C. 1251 *et seq.*) form the legal foundation for the NRDA Restoration Program and provide the legal authority to carry out Restoration Program responsibilities (USFWS 2009). The majority of countries within the range of Brown Pelicans are parties to one of more international conventions, including the International Convention on Civil Liability for Oil Pollution Damage, International Convention on Oil Pollution Preparedness Response and Co-operation, International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, and the International Convention on the Establishment of an International Fund of Compensation for Oil Pollution Damage. These measures reduce the probability of spills and may reduce adverse impacts when they occur (USFWS 2009).

Vessel safety and oil spill prevention efforts in Washington have decreased the amount of oil spilled, and improved response has reduced the impacts of spills. The annual average volume of oil spilled in Washington from spills greater than 10,000 gallons during 1987-91 was 327,000 gallons, while the average from January 1992 through June 1996 was 72,000 gallons — a 78 percent reduction, though the

trend is exaggerated by multiple large spills in 1991 (Neel et al. 1997). Past steps to mitigate the threat of oil spills include creation of an Area to Be Avoided (ATBA) established off the northwest coast of Washington encouraging large vessels to stay well off shore during transit along the coast (NOAA 2012 flyer available at: http://olympiccoast.noaa.gov/protect/incidentresponse/atbamap.html). In 2009, the Washington Legislature passed legislation that requires stationing of a rescue tug in Neah Bay to be able to respond to vessels with impaired maneuverability near the entrance to the Strait of Juan de Fuca (RCW 88.46.130; RCW 90.56.500). However, proposals to expand the Trans-Mountain Pipeline and increase oil handling capacity at Delta Port in British Columbia could add hundreds of additional tanker, barge, and large ship transits of the waters of the Strait of Juan de Fuca and northern Puget Sound. This would likely result in an increased risk of oil spills in this area (Van Dorp and Merrick 2013). Spills at the mouth of the Strait of Juan de Fuca could spread and be moved south to areas where impact to Brown Pelicans is possible.

In addition to improvements in regulations and response capabilities, the U.S. Fish and Wildlife Service concluded that oil spills are localized and infrequent within the range of California Brown Pelicans (USFWS 2009). An oil spill, even a major one, would likely only affect a fraction of the population, and the threat was not significant enough to prevent delisting of the populations. Response capabilities to address the needs of fish and wildlife resources include the Department of Fish and Wildlife Oil Spill Team, formed in 1992, that provides round-the-clock oil spill response.

Injury and Entanglement by Fishing Gear

Fishing tackle can cause direct physical injury to pelicans. Pelicans are occasionally hooked by people fishing from piers or boats. Superficially embedded hooks can often be removed without damage; however, a small tear in a gular pouch can hinder feeding and death from starvation may occur (USFWS 1983). Mortality can also occur if a hook is swallowed. Pelicans can become ensnared in monofilament fishing line which can result in serious injury and death (USFWS 1983). Fishing gear interactions can affect individual Brown Pelicans, but there are no data suggesting this is a significant factor affecting Brown Pelican populations (USFWS 2009).

Harmful Algal Blooms

Brown Pelicans are affected by at least two kinds of harmful algal blooms or ‘red tides.’ In 1991, 43 Brown Pelicans died near Santa Cruz, California, after ingesting northern anchovies that had been grazing on *Pseudonitzschia australis,* a dinoflagellate that produces domoic acid, a neurotoxin. A similar event at Pablo San Lucas, Baja, killed 150 Brown Pelicans after eating contaminated mackerel (Shumway et al. 2003). Domoic acid poisoning can affect marine birds and mammals, including humans, in which it is called ‘amnesic shellfish poisoning.’

A Brown Pelican was among hundreds of stranded marine birds of 14 species during a massive red tide caused by the dinoflagellate *Akashio sanguinea* during November-December 2007 in Monterey Bay, California (Jessup et al. 2009). Foam containing surfactant-like proteins from the cellular breakdown of the dinoflagellate had fouled the birds’ plumage, causing waterlogging, hypothermia, and stranding or death. A similar event, also caused by *A. sanguinea* occurred in late October 2009 along the southern Washington and northern Oregon coasts (Phillips et al. 2011); at least several hundred seabirds were collected dead from beaches or captured and brought to rehabilitation centers. Species affected included loons (*Gavia immer, G. pacifica*, and *G. stellata*), Surf Scoters (*Melanitta perspicillata*), grebes (*Aechmophorus occidentalis* and *A. clarkii*), and Common Murres. Brown Pelicans, most having departed the area at that time of year, were not reported among the species collected (Phillips et al. 2011).

The impact of harmful algal blooms on populations of pelicans and other seabirds is not well understood, and the numbers of birds recovered likely underestimates the total mortality, as many birds die and sink, and do not wash ashore (Shumway et al. 2003). Some species of marine birds seem to learn to avoid prey that have accumulated toxins, but species that swallow fish whole, like pelicans, may be less able to respond before being affected (Shumway et al. 2003). There are some indications that harmful algal blooms are increasing in frequency as a result of degraded water quality along coasts, and possibly climate change (Jessup et al. 2009, Phillips et al. 2011). Philips et al. (2011) suggested continued regional cooperation to document events and the development of response networks to respond to such events.

Wind Turbines

Although there are currently no offshore wind turbines in Washington that could affect Brown Pelicans, conflicts between wind turbines and waterbirds arise due to the coincidence of shallow seas favored as both wind energy sites and foraging areas, combined with the use of wind for both migration flyways and wind turbine operation (USFWS 2007). Wind turbines pose a threat to individual birds through collision, and potentially affect movement patterns, access to breeding colonies and roost sites, and foraging behaviors (USFWS 2007).

The effects of wind farms on pelican species are unclear, however, reports of avian mortality due to wind turbine collisions in Europe and the U.S. suggested higher collision frequency for medium to larger birds (Erickson et al. 2001). Eagles, cranes, swans, geese, and pelicans frequently fly at rotor-swept-height, and the combination of their large size and flight behaviors suggests a greater probability of collision with wind turbines (Smales 2006). A fatal collision with a wind turbine has been recorded for a Brown Pelican at Altamont Pass, an inland wind farm in California (Erickson et al. 2001), and an American White Pelican was reportedly killed by a turbine strike at a coastal site in Texas (http://www.surfbirds.com/birdingmail.Mail/Texas_Birds/735862), but there are as yet no reports of collisions at offshore wind farms. Despite the potential for significant offshore turbine impacts on waterbirds, little research has been conducted in the U.S., and finding carcasses at sea is very challenging (USFWS 2012). A study of impacts of two offshore windfarms in Denmark showed that birds generally avoided wind turbines (Petersen et al. 2006), suggesting a loss of habitat, but generally a low risk of collisions.

CONCLUSIONS AND RECOMMENDATION

Brown Pelicans visiting Washington belong to the California subspecies, which ranges along the west coast of North America. The subspecies does not breed in Washington, but occurs seasonally in substantial numbers in Washington's outer coastal waters. East Sand Island in the Columbia River estuary, which has grown to be the largest night roost for Brown Pelicans in the Pacific Northwest, has seasonally hosted up to 16,000 birds, and additional birds roost in Willapa Bay, Grays Harbor, and other sites north to Neah Bay. Although East Sand Island and many other roost sites are somewhat vulnerable to human disturbance, most are publically owned, and public access is restricted or otherwise difficult.

The primary reason for the severe decline in the California Brown Pelican population in the mid-20th century was DDT contamination, particularly in the Southern California Bight, but this is no longer a serious threat. Pelican numbers recovered dramatically in the early 1980s in the Southern California Bight, although reproductive success has varied widely from year to year. There are several remaining

factors affecting or potentially affecting the subspecies, but not to a degree that they threaten the population. These factors include disturbance of nesting colonies, the potential for oil spills and harmful algae blooms, and fluctuations in prey availability related to natural oscillations of the ocean temperature regime and long-term climate change. The population of the subspecies has remained relatively stable since the 1980s, and the population is now estimated at about 195,000 birds (Anderson et al. 2013). The California Brown Pelican (along with the Gulf of Mexico population) was delisted under the federal Endangered Species Act in 2009 (USFWS 2009).

The number of Brown Pelicans occurring in Washington has increased markedly since the 1980s, likely as a result of increasing abundance of forage fish due to changes in ocean conditions, and perhaps the recovery of the Southern California Bight population. Pelican abundance in the future may vary dramatically with ocean conditions. A shift to a cold water regime during 2010-2013, and the related decline in sardines may have caused the observed drop in seasonal abundance of Brown Pelicans at sites in Washington. However, during the winter of 2013/2014, indicators suggested a return to a warm water regime that presumably will result in a rebound of sardine abundance. These natural fluctuations in ocean conditions and forage fish abundance cannot be prevented by management actions.

Brown Pelicans are no longer seriously threatened by human-related factors, and their abundance in Washington is related to ocean conditions that are not amenable to management action. For these reasons, the Brown Pelican no longer meets the definition of endangered, threatened, or sensitive in Washington, as defined in WAC 232-12-297. Endangered species are, *"seriously threatened with extinction throughout all or a significant portion of its range within the state."* A threatened species is, *"likely to become an endangered species within the foreseeable future throughout a significant portion of its range within the state without cooperative management or removal of threats."* A state sensitive species is defined as, *"vulnerable or declining and is likely to become endangered or threatened in a significant portion of its range within the state without cooperative management or removal of threats"* (Appendix A; WAC 232-12-297).

It is recommended that the Brown Pelican be removed from the state endangered list in Washington. However, it should remain on the Priority Habitats and Species (PHS) list because roosts, particularly night roosts, constitute vulnerable aggregations, Criterion 2 for inclusion as a Priority Species. As required in WAC 232-12-297, the status of Brown Pelicans in Washington would be reviewed and a report issued five years following delisting. Brown Pelicans, if delisted, would remain classified as 'protected wildlife' under state law (Appendix A; WAC 232-12-011) and protected under the federal Migratory Bird Treaty Act.

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All birds not classified as game birds, predatory birds or endangered species, or designated as threatened species or sensitive species; all bats, except when found in or immediately adjacent to a dwelling or other occupied building; mammals of the order Cetacea, including whales, porpoises, and mammals of the order Pinnipedia not otherwise classified as endangered species, or designated as threatened species or sensitive species. This section shall not apply to hair seals and sea lions which are threatening to damage or are damaging commercial fishing gear being utilized in a lawful manner or when said mammals are damaging or threatening to damage commercial fish being lawfully taken with commercial gear.

[Statutory Authority: RCW 77.12.047, 77.12.020. 08-03-068 (Order 08-09), § 232-12-011, filed 1/14/08, effective 2/14/08; 06-04-066 (Order 06-09), § 232-12-011, filed 1/30/06, effective 3/2/06. Statutory Authority: RCW 77.12.047, 77.12.655, 77.12.020. 02-11-069 (Order 02-98), § 232-12-011, filed 5/10/02, effective 6/10/02. Statutory Authority: RCW 77.12.047. 02-08-048 (Order 02-53), § 232-12-011, filed 3/29/02, effective 5/1/02; 00-17-106 (Order 00-149), § 232-12-011, filed 8/16/00, effective 9/16/00. Statutory Authority: RCW 77.12.040, 77.12.010, 77.12.020, 77.12.770. 00-10-001 (Order 00-47), § 232-12-011, filed 4/19/00, effective 5/20/00. Statutory Authority: RCW 77.12.040, 77.12.010, 77.12.020, 77.12.770, 77.12.780. 00-04-017 (Order 00-05), § 232-12-011, filed 1/24/00, effective 2/24/00. Statutory Authority: RCW 77.12.020. 98-23-013 (Order 98-232), § 232-12-011, filed 11/6/98, effective 12/7/98. Statutory Authority: RCW 77.12.040. 98-10-021 (Order 98-71), § 232-12-011, filed 4/22/98, effective 5/23/98. Statutory Authority: RCW 77.12.040 and 75.08.080. 98-06-031, § 232-12-011, filed 2/26/98, effective 5/1/98. Statutory Authority: RCW 77.12.020. 97-18-019 (Order 97-167), § 232-12-011, filed 8/25/97, effective 9/25/97. Statutory Authority: RCW 77.12.040, 77.12.020, 77.12.030 and 77.32.220. 97-12-048, § 232-12-011, filed 6/2/97, effective 7/3/97. Statutory Authority: RCW 77.12.020. 93-21-027 (Order 615), § 232-12-011, filed 10/14/93, effective 11/14/93; 90-11-065 (Order 441), § 232-12-011, filed 5/15/90, effective 6/15/90. Statutory Authority: RCW 77.12.040. 89-11-061 (Order 392), § 232-12-011, filed 5/18/89; 82-19-026 (Order 192), § 232-12-011, filed 9/9/82; 81-22-002 (Order 174), § 232-12-011, filed 10/22/81; 81-12-029 (Order 165), § 232-12-011, filed 6/1/81.]

WAC 232-12-014 Wildlife classified as endangered species. Endangered species include:

Common Name	**Scientific Name**
pygmy rabbit	*Brachylagus idahoensis*
fisher	*Martes pennanti*
gray wolf	*Canis lupus*
grizzly bear	*Ursus arctos*
sea otter	*Enhydra lutris*
sei whale	*Balaenoptera borealis*
fin whale	*Balaenoptera physalus*
blue whale	*Balaenoptera musculus*
humpback whale	*Megaptera novaeangliae*
black right whale	*Balaena glacialis*
sperm whale	*Physeter macrocephalus*
killer whale	*Orcinus orca*
Columbian white-tailed deer	*Odocoileus virginianus leucurus*
woodland caribou	*Rangifer tarandus caribou*
American white pelican	*Pelecanus erythrorhynchos*
brown pelican	*Pelecanus occidentalis*
sandhill crane	*Grus canadensis*
snowy plover	*Charadrius alexandrinus*
upland sandpiper	*Bartramia longicauda*
spotted owl	*Strix occidentalis*
Streaked horned lark	*Eremophila alpestris strigata*
western pond turtle	*Clemmys marmorata*
leatherback sea turtle	*Dermochelys coriacea*
mardon skipper	*Polites mardon*
Oregon silverspot butterfly	*Speyeria zerene hippolyta*
Taylor's checkerspot	*Euphydryas editha taylori*
Oregon spotted frog	*Rana pretiosa*
northern leopard frog	*Rana pipiens*

[Statutory Authority: RCW 77.12.047, 77.12.655, 77.12.020. 06-04-066 (Order 06-09), § 232-12-014, filed 1/30/06, effective 3/2/06. Statutory Authority: RCW 77.12.047, 77.12.655, 77.12.020. 02-11-069 (Order 02-98), § 232-12-014, filed 5/10/02, effective 6/10/02. Statutory Authority: RCW 77.12.040, 77.12.010, 77.12.020, 77.12.770, 77.12.780. 00-04-017 (Order 00-05), § 232-12-014, filed 1/24/00, effective 2/24/00. Statutory Authority: RCW 77.12.020. 98-23-013 (Order 98-232), § 232-12-014, filed 11/6/98, effective 12/7/98; 97-18-019 (Order 97-167), § 232-12-014, filed 8/25/97, effective 9/25/97; 93-21-026 (Order 616), § 232-12-014, filed 10/14/93, effective 11/14/93. Statutory Authority: RCW 77.12.020(6). 88-05-032 (Order 305), § 232-12-014, filed 2/12/88. Statutory Authority: RCW 77.12.040. 82-19-026 (Order 192), § 232-12-014, filed 9/9/82; 81-22-002 (Order 174), § 232-12-014, filed 10/22/81; 81-12-029 (Order 165), § 232-12-014, filed 6/1/81.]

WAC 232-12-297 Endangered, threatened, and sensitive wildlife species classification.

PURPOSE

1.1 The purpose of this rule is to identify and classify native wildlife species that have need of protection and/or management to ensure their survival as free-ranging populations in Washington and to define the process by which listing, management, recovery, and delisting of a species can be achieved. These rules are established to ensure that consistent procedures and criteria are followed when classifying wildlife as endangered, or the protected wildlife subcategories threatened or sensitive.

DEFINITIONS

For purposes of this rule, the following definitions apply:

2.1 "Classify" and all derivatives means to list or delist wildlife species to or from endangered, or to or from the protected wildlife subcategories threatened or sensitive.

2.2 "List" and all derivatives means to change the classification status of a wildlife species to endangered, threatened, or sensitive.

2.3 "Delist" and its derivatives means to change the classification of endangered, threatened, or sensitive species to a classification other than endangered, threatened, or sensitive.

2.4 "Endangered" means any wildlife species native to the state of Washington that is seriously threatened with extinction throughout all or a significant portion of its range within the state.

2.5 "Threatened" means any wildlife species native to the state of Washington that is likely to become an endangered species within the foreseeable future throughout a significant portion of its range within the state without cooperative management or removal of threats.

2.6 "Sensitive" means any wildlife species native to the state of Washington that is vulnerable or declining and is likely to become endangered or threatened in a significant portion of its range within the state without cooperative management or removal of threats.

2.7 "Species" means any group of animals classified as a species or subspecies as commonly accepted by the scientific community.

2.8 "Native" means any wildlife species naturally occurring in Washington for purposes of breeding, resting, or foraging, excluding introduced species not found historically in this state.

2.9 "Significant portion of its range" means that portion of a species' range likely to be essential to the long-term survival of the population in Washington.

LISTING CRITERIA

3.1 The commission shall list a wildlife species as endangered, threatened, or sensitive solely on the basis of the biological status of the species being considered, based on the preponderance of scientific data available, except as noted in section 3.4.

3.2 If a species is listed as endangered or threatened under the federal Endangered Species Act, the agency will recommend to the commission that it be listed as endangered or threatened as specified in section 9.1. If listed, the agency will proceed with development of a recovery plan pursuant to section 11.1.

3.3 Species may be listed as endangered, threatened, or sensitive only when populations are in danger of failing, declining, or are vulnerable, due to factors including but not restricted to limited numbers, disease, predation, exploitation, or habitat loss or change, pursuant to section 7.1.

3.4 Where a species of the class Insecta, based on substantial evidence, is determined to present an unreasonable risk to public health, the commission may make the determination that the species need not be listed as endangered, threatened, or sensitive.

DELISTING CRITERIA

4.1 The commission shall delist a wildlife species from endangered, threatened, or sensitive solely on the basis of the biological status of the species being considered, based on the preponderance of scientific data available.

4.2 A species may be delisted from endangered, threatened, or sensitive only when populations are no longer in danger of failing, declining, are no longer vulnerable, pursuant to section 3.3, or meet recovery plan goals, and when it no longer meets the definitions in sections 2.4, 2.5, or 2.6.

INITIATION OF LISTING PROCESS

5.1 Any one of the following events may initiate the listing process.

5.1.1 The agency determines that a species population may be in danger of failing, declining, or vulnerable, pursuant to section 3.3.

5.1.2 A petition is received at the agency from an interested person. The petition should be addressed to the director. It should set forth specific evidence and scientific data which shows that the species may be failing, declining, or vulnerable, pursuant to section 3.3. Within 60 days, the agency shall either deny the petition, stating the reasons, or initiate the classification process.

5.1.3 An emergency, as defined by the Administrative Procedure Act, chapter 34.05 RCW. The listing of any species previously classified under emergency rule shall be governed by the provisions of this section.

5.1.4 The commission requests the agency review a species of concern.

5.2 Upon initiation of the listing process the agency shall publish a public notice in the Washington Register, and notify those parties who have expressed their interest to the department, announcing the initiation of the classification process and calling for scientific information relevant to the species status report under consideration pursuant to section 7.1.

INITIATION OF DELISTING PROCESS

6.1 Any one of the following events may initiate the delisting process:

6.1.1 The agency determines that a species population may no longer be in danger of failing, declining, or vulnerable, pursuant to section 3.3.

6.1.2 The agency receives a petition from an interested person. The petition should be addressed to the director. It should set forth specific evidence and scientific data which shows that the species may no longer be failing, declining, or vulnerable, pursuant to section 3.3. Within 60 days, the agency shall either deny the petition, stating the reasons, or initiate the delisting process.

6.1.3 The commission requests the agency review a species of concern.

6.2 Upon initiation of the delisting process the agency shall publish a public notice in the Washington Register, and notify those parties who have expressed their interest to the department, announcing the initiation of the delisting process and calling for scientific information relevant to the species status report under consideration pursuant to section 7.1.

SPECIES STATUS REVIEW AND AGENCY RECOMMENDATIONS

7.1 Except in an emergency under 5.1.3 above, prior to making a classification recommendation to the commission, the agency shall prepare a preliminary species status report. The report will include a review of information relevant to the species' status in Washington and address factors affecting its status, including those given under section 3.3. The status report shall be reviewed by the public and scientific community. The status report will include, but not be limited to an analysis of:

7.1.1 Historic, current, and future species population trends.

7.1.2 Natural history, including ecological relationships (e.g. food habits, home range, habitat selection patterns).

7.1.3 Historic and current habitat trends.

7.1.4 Population demographics (e.g. survival and mortality rates, reproductive success) and their relationship to long term sustainability.

7.1.5 Historic and current species management activities.

7.2 Except in an emergency under 5.1.3 above, the agency shall prepare recommendations for species classification, based upon scientific data contained in the status report. Documents shall be prepared to determine the environmental consequences of adopting the recommendations pursuant to requirements of the State Environmental Policy Act (SEPA).

7.3 For the purpose of delisting, the status report will include a review of recovery plan goals.

PUBLIC REVIEW

8.1 Except in an emergency under 5.1.3 above, prior to making a recommendation to the commission, the agency shall provide an opportunity for interested parties to submit new scientific data relevant to the status report, classification recommendation, and any SEPA findings.

8.1.1 The agency shall allow at least 90 days for public comment.

FINAL RECOMMENDATIONS AND COMMISSION ACTION

9.1 After the close of the public comment period, the agency shall complete a final status report and classification recommendation. SEPA documents will be prepared, as necessary, for the final agency recommendation for classification. The classification recommendation will be presented to the commission for action. The final species status report, agency classification recommendation, and SEPA documents will be made available to the public at least 30 days prior to the commission meeting.

9.2 Notice of the proposed commission action will be published at least 30 days prior to the commission meeting.

PERIODIC SPECIES STATUS REVIEW

10.1 The agency shall conduct a review of each endangered, threatened, or sensitive wildlife species at least every five years after the date of its listing. This review shall include an update of the species status report to determine whether the status of the species warrants its current listing status or deserves reclassification.

10.1.1 The agency shall notify any parties who have expressed their interest to the department of the periodic status review. This notice shall occur at least one year prior to end of the five year period required by section 10.1.

10.2 The status of all delisted species shall be reviewed at least once, five years following the date of delisting.

10.3 The department shall evaluate the necessity of changing the classification of the species being reviewed. The agency shall report its findings to the commission at a commission meeting. The agency shall notify the public of its findings at least 30 days prior to presenting the findings to the commission.

10.3.1 If the agency determines that new information suggests that classification of a species should be changed from its present state, the agency shall initiate classification procedures provided for in these rules starting with section 5.1.

10.3.2 If the agency determines that conditions have not changed significantly and that the classification of the species should remain unchanged, the agency shall recommend to the commission that the species being reviewed shall retain its present classification status.

10.4 Nothing in these rules shall be construed to automatically delist a species without formal commission action.

RECOVERY AND MANAGEMENT OF LISTED SPECIES

11.1 The agency shall write a recovery plan for species listed as endangered or threatened. The agency will write a management plan for species listed as sensitive. Recovery and management plans shall address the listing criteria described in sections 3.1 and 3.3, and shall include, but are not limited to:

11.1.1 Target population objectives.

11.1.2 Criteria for reclassification.

11.1.3 An implementation plan for reaching population objectives which will promote cooperative management and be sensitive to landowner needs and property rights. The plan will specify resources needed from and impacts to the department, other agencies (including federal, state, and local), tribes, landowners, and other interest groups. The plan shall consider various approaches to meeting recovery objectives including, but not limited to regulation, mitigation, acquisition, incentive, and compensation mechanisms.

11.1.4 Public education needs.

11.1.5 A species monitoring plan, which requires periodic review to allow the incorporation of new information into the status report.

11.2 Preparation of recovery and management plans will be initiated by the agency within one year after the date of listing.

11.2.1 Recovery and management plans for species listed prior to 1990 or during the five years following the adoption of these rules shall be completed within 5 years after the date of listing or adoption of these rules, whichever comes later. Development of recovery plans for endangered species will receive higher priority than threatened or sensitive species.

11.2.2 Recovery and management plans for species listed after five years following the adoption of these rules shall be completed within three years after the date of listing.

11.2.3 The agency will publish a notice in the Washington Register and notify any parties who have expressed interest to the department interested parties of the initiation of recovery plan development.

11.2.4 If the deadlines defined in sections 11.2.1 and 11.2.2 are not met the department shall notify the public and report the reasons for missing the deadline and the strategy for completing the plan at a commission meeting. The intent of this section is to recognize current department personnel resources are limiting and that development of recovery plans for some of the species may require significant involvement by interests outside of the department, and therefore take longer to complete.

11.3 The agency shall provide an opportunity for interested public to comment on the recovery plan and any SEPA documents.

CLASSIFICATION PROCEDURES REVIEW

12.1 The agency and an ad hoc public group with members representing a broad spectrum of interests, shall meet as needed to accomplish the following:

12.1.1 Monitor the progress of the development of recovery and management plans and status reviews, highlight problems, and make recommendations to the department and other interested parties to improve the effectiveness of these processes.

12.1.2 Review these classification procedures six years after the adoption of these rules and report its findings to the commission.

AUTHORITY

13.1 The commission has the authority to classify wildlife as endangered under RCW 77.12.020. Species classified as endangered are listed under WAC 232-12-014, as amended.

13.2 Threatened and sensitive species shall be classified as subcategories of protected wildlife. The commission has the authority to classify wildlife as protected under RCW 77.12.020. Species classified as protected are listed under WAC 232-12-011, as amended.

[Statutory Authority: RCW 77.12.047, 77.12.655, 77.12.020. 02-02-062 (Order 01-283), § 232-12-297, filed 12/28/01, effective 1/28/02. Statutory Authority: RCW 77.12.040. 98-05-041 (Order 98-17), § 232-12-297, filed 2/11/98, effective 3/14/98. Statutory Authority: RCW 77.12.020. 90-11-066 (Order 442), § 232-12-297, filed 5/15/90, effective 6/15/90.]

WASHINGTON STATE STATUS REPORTS, PERIODIC STATUS REVIEWS, RECOVERY PLANS, AND CONSERVATION PLANS

Status Reports

2015	Tufted Puffin
2007	Bald Eagle
2005	Mazama Pocket Gopher, Streaked Horned Lark, and Taylor's Checkerspot
2005	Aleutian Canada Goose
2004	Killer Whale
2002	Peregrine Falcon
2000	Common Loon
1999	Northern Leopard Frog
1999	Olympic Mudminnow
1999	Mardon Skipper
1999	Lynx Update
1998	Fisher
1998	Margined Sculpin
1998	Pygmy Whitefish
1998	Sharp-tailed Grouse
1998	Sage-grouse
1997	Aleutian Canada Goose
1997	Gray Whale
1997	Olive Ridley Sea Turtle
1997	Oregon Spotted Frog
1993	Larch Mountain Salamander
1993	Lynx
1993	Marbled Murrelet
1993	Oregon Silverspot Butterfly
1993	Pygmy Rabbit
1993	Steller Sea Lion
1993	Western Gray Squirrel
1993	Western Pond Turtle

Periodic Status Reviews

2015	Steller Sea Lion

Recovery Plans

2012	Columbian Sharp-tailed Grouse
2011	Gray Wolf
2011	Pygmy Rabbit: Addendum
2007	Western Gray Squirrel
2006	Fisher
2004	Sea Otter
2004	Greater Sage-Grouse
2003	Pygmy Rabbit: Addendum
2002	Sandhill Crane
2001	Pygmy Rabbit: Addendum
2001	Lynx
1999	Western Pond Turtle
1996	Ferruginous Hawk
1995	Pygmy Rabbit
1995	Upland Sandpiper
1995	Snowy Plover

Conservation Plans

2013	Bats

Status reports and plans are available on the WDFW website at:
http://wdfw.wa.gov/publications/search.php

References Reviewed for the *Periodic Status Review for the Brown Pelican*

Table B presents the references that are cited in the *Periodic Status Review for the Brown Pelican*. Each reference is categorized for its level of peer review pursuant to section 34.05.271 RCW, which is the codification of Substitute House Bill 2661 that passed the Washington Legislature in 2014. A key to the review categories under section 34.05.271 RCW is provided in Table A. References were categorized by Derek Stinson in February 2015.

Individual papers cited cover a number of topics discussed in the report, including information on: 1) the species' description, taxonomy, distribution, and biology; 2) habitat requirements; 3) population status and trends; 4) conservation status and protections; 5) research, monitoring, and restoration activities; and 6) factors affecting the continued existence of the species.

Table A. Key to 34.05.271 RCW Categories:

Category Code	34.05.271(1)(c) RCW
i	(i) Independent peer review: review is overseen by an independent third party.
ii	(ii) Internal peer review: review by staff internal to the department of fish and wildlife.
iii	(iii) External peer review: review by persons that are external to and selected by the department of fish and wildlife.
iv	(iv) Open review: documented open public review process that is not limited to invited organizations or individuals.
v	(v) Legal and policy document: documents related to the legal framework for the significant agency action including but not limited to: (A) federal and state statutes; (B) court and hearings board decisions; (C) federal and state administrative rules and regulations; and (D) policy and regulatory documents adopted by local governments.
vi	(vi) Data from primary research, monitoring activities, or other sources, but that has not been incorporated as part of documents reviewed under the processes described in (c)(i), (ii), (iii), and (iv) of this subsection.
vii	(vii) Records of the best professional judgment of department of fish and wildlife employees or other individuals.
viii	(viii) Other: Sources of information that do not fit into one of the categories identified in this subsection (1)(c).

Table B Reference	34.05.271 RCW Review Category
Ainley, D. G., R. L. Veit, S. G. Allen, L. B. Spear, and P. Pyle. 1995. Variations in marine bird communities of the California Current, 1986-1994. California Cooperative Oceanic Fisheries Investigations Report 36:72-77.	i
AOU (American Ornithologists' Union). 1998. Check-list of North American birds. 7th edition. Forty-fifth supplement to the American Ornithologists' Union. Auk 121:985-995.	i
Anderson, D. W. and F. Gress. 1983. Status of a northern population of California Brown Pelicans. Condor 85:79-88.	i
Anderson, D. W., and F. Gress. 1984. Brown Pelicans and the anchovy fishery off southern California. Pp128-135, in D. N. Nettleship, G. A. Sanger, and P. F. Springer. (eds) Marine birds: their feeding ecology and commercial fisheries relationships. Proceedings of the Pacific Seabird Group Symposium, Seattle, Washington, 6-8 January 1982. Special Publication, Canadian Wildlife Service. 220 pp.	i
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Auth, T. D., R. D. Brodeur, H. L. Soulen, L. Ciannelli, and W. T. Peterson. 2011. The response of fish larvae to decadal changes in environmental forcing factors off the Oregon coast. Fisheries Oceanography 20(4):314-328.	i
Balmer, A. 1938. Chilean skuas and California brown pelicans along the Washington coast. Murrelet 19:18.	i
Bargmann, G. 1998. Forage Fish Management Plan: a plan for managing the forage fish resources and fisheries of Washington. Washington Department of Fish and Wildlife, Olympia, Washington. 66 pp.	ii,iii,iv
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Bird Research Northwest. 2014. Columbia River Estuary, Weekly Update for 6/9 – 6/15. (http://www.birdresearchnw.org/Project-Info/weekly-update/columbia-river-estuary-weekly-update/default.aspx)	vi
Briggs, K.T., D.B. Lewis, W. Breck Tyler, and G.L. Hunt, Jr. 1981. Brown pelicans in southern California: Habitat use and environmental fluctuations. Condor 83(1):1-15.	i
Briggs, K.T.. W. B. Tyler, D. B. Lewis, P. R. Kelly, and D. A. Croll. 1983. Brown Pelicans in central and northern California. Journal of Field Ornithology, 54(4):353-373.	i
Brodeur, R. D., J. P. Fisher, R. L. Emmett, C. A. Morgan, and E. Casillas. 2005. Species composition and community structure of pelagic nekton off Oregon and Washington under variable oceanographic conditions. Marine Ecology Progress Series 298:41–57.	i
Burkett, E. E., R. J. Logsdon, and K. M. Fien. 2007. Report to the California Fish and Game Commission: Status Review of California Brown Pelican (*Pelicanus occidentalis californicus*) in California. Calif. Dept. of Fish and Game, Wildlife Branch, Nongame Wildlife Program Report 2007-04. 26 pp+ appendices.	vi,viii

Table B Reference	34.05.271 RCW Review Category
CDFW (California Department of Fish and Wildlife) 2014. Review of selected California fisheries for 2013: coastal pelagic finfish, market squid, groundfish, highly migratory species, Dungeness crab, basses, surfperch, abalone, kelp and edible algae, and marine aquaculture. Fisheries Review. CalCOFI Reports 55:11-50.	i
Center for Biological Diversity. 2011. A Deadly Toll: The Gulf Oil Spill and the Unfolding Wildlife Disaster. Report. Center for Biodiversity, Tucson, Arizona. 11 pp.	viii
Chavez, F. P., J. Ryan, S. E. Lluch-Cota, M. Niquen. 2003. From anchovies to sardines and back: multidecadal change in the Pacific Ocean. Science 299 (10 January):217-221.	i
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Croll, D. A., L. T. Balance, B. G. Wursig and W. B. Tyler. 1986. Movements and daily activity patterns of a Brown Pelican in central California. Condor 88:258-260.	i
Crone, P. R., K. T. Hill, J. D. McDaniel, and K. Lynn. 2011. Pacific mackerel (*Scomber japonicus*) stock assessment for USA management in the 2011-12 fishing year. Pacific Fishery Management Council, Portland, Oregon. 100 p.	viii
Cury, P. M., I. L. Boyd, S. Bonhommeau, T. Anker-Nilssen, R. J. M. Crawford, R. W. Furness, J. A. Mills, E. J. Murphy, H. Osterblom, M. Paleczny, J. F. Piatt, J. P. Roux, L. Shannon, W. J. Sydeman. 2011. Global seabird response to forage fish depletion—one-third for the birds. Science 334:1703-1706.	i
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Fox, D. S., S. Bell, W. Nehlsen, J. Damron, and Krebill. 1984. The Columbia River Estuary: Atlas of Physical and Biological Characteristics. Columbia River Estuary Data Development Program. 57 pp.	viii
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Merrifield, K. 2003a. Heermann's Gull, pp 261-262, in D. B. Marshall, M. G. Hunter, and A. L. Contreras (eds.) Birds of Oregon. Oregon State University Press, Corvallis, Oregon. 752 pp.	i
Merrifield, K. 2003b. Elegant Tern, pp 279-280, in D. B. Marshall, M. G. Hunter, and A. L. Contreras (eds.) Birds of Oregon. Oregon State University Press, Corvallis, Oregon. 752 pp.	i

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